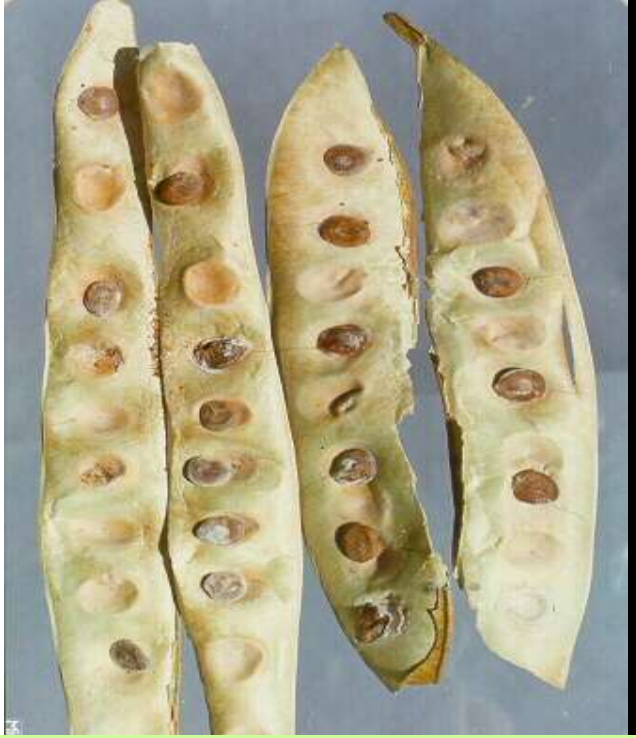

Common disease problems and their management in forest seeds and nurseries

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Disease **– An unhealthy state- is a disturbance in the normal physiological functioning of plant, has many causes and exhibits an array of symptoms**

Disease – result of an extended interaction between a pathogen, the host and environment

Seed borne diseases

Seeds get infected during development while still on the trees and/or during storage, due to poor collection and storage practices

- Externally seed borne –

  By fungi causing spoilage – deterioration of seed contents – reducing quality as well as quantity

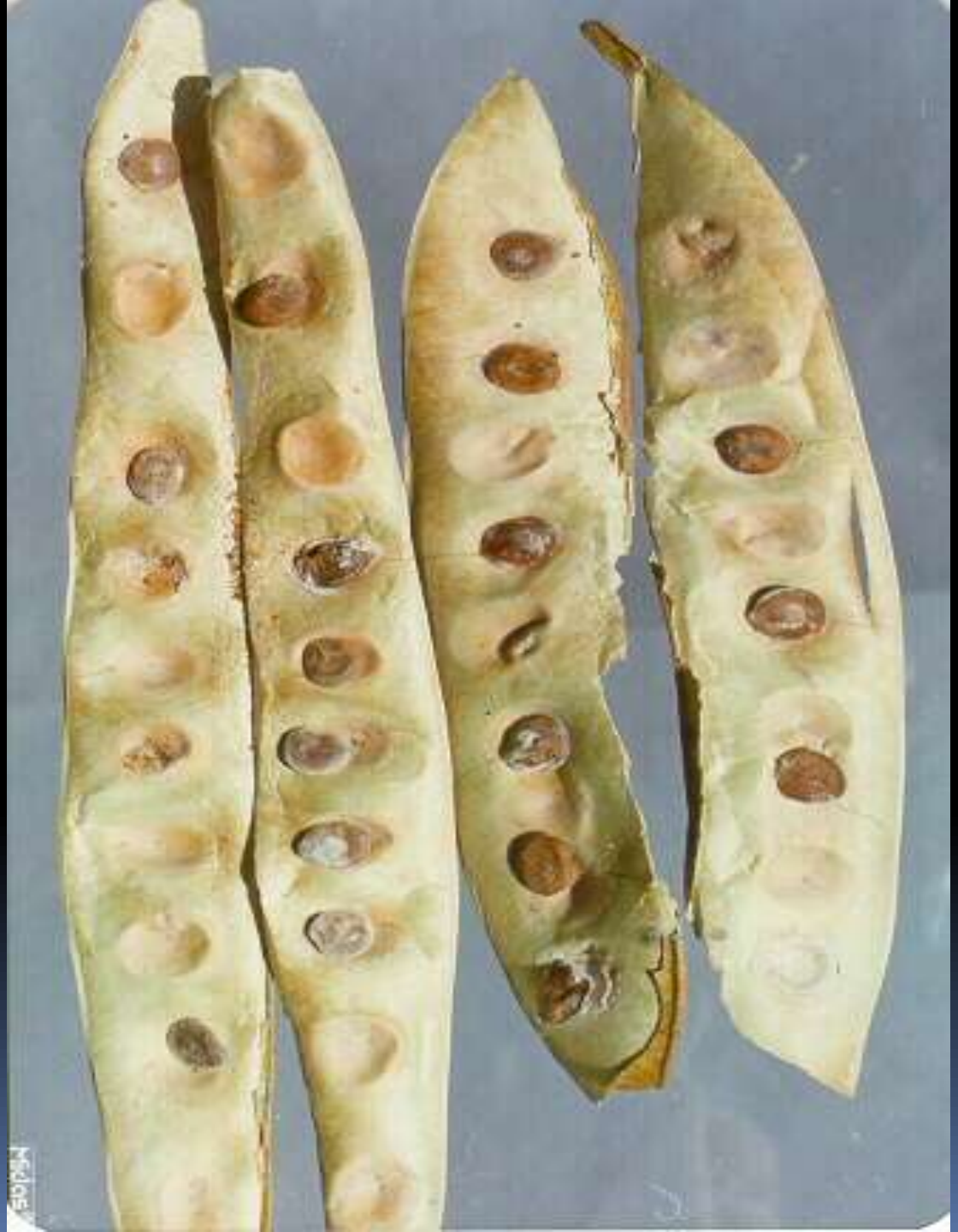
  Affect seed germination by causing pre-emergence and post-emergence damping-off diseases

- Internally seed borne

  By fungi causing deep seated infection – affect viability by killing embryo, source of pre- and post-emergence damping-off disease

Symptoms

- Change in seed colour – deviation from normal seed colour – darker, spotted or lighter
- Change in seed size – enlargement or reduction
- Wrinkled seed surface
- Fungoid seeds
- Foul smell



Infected seeds inside pods – *Albizia lebbek*

Variation in seed size & colour – *Moringa pterygosperma*

Variation in seed colour – *Withania somnifera*

Fungoid seeds of *Albizia lebbek* & fruit of *Emblica officinalis*

Root Diseases in Nurseries and their Management

- **Damping-off disease**

⇒ Pre-emergence blight/damping-off – seeds get infected during the process of germination and/ or soon after germination and seedlings do not emerge out of the soil

⇒ Post-emergence damping-off – seedlings get infected soon after emergence on the soil at collar region and seedlings topple over the ground and die

⇒ Nearly 70 per cent mortality occurs in nurseries due to damping-off diseases

Blank patches are common in nursery beds due to pre-emergence damping-off

Root diseases….

Post-emergence damping-off in shisham (*Dalbergia sissoo*)

Root diseases….

Post-emergence damping-off in *Albizia lebbek* and *Moringa pterygosperma*

Root diseases….

Post-emergence damping-off in *Pinus roxburghi*

Root diseases….

Post-emergence damping-off in *Pinus roxburghi*

Vascular wilt disease syndrome in seedlings

Variety of macroscopic symptoms characterized by:

- intermittent wilting due to loss of turgor

- desiccation of leaves in acropetal succession towards the stem apex

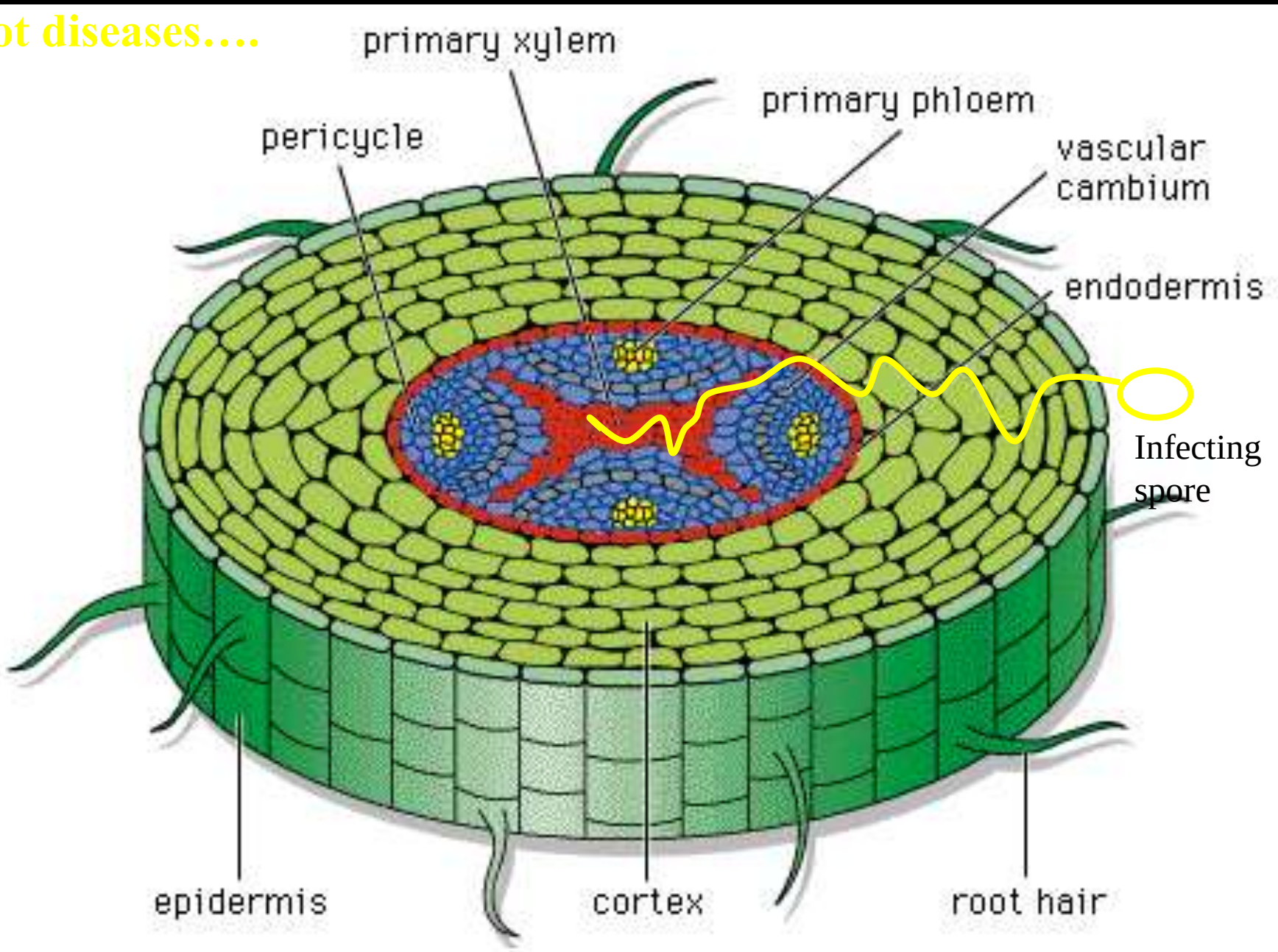
- usually proceeds by leaf yellowing

Other symptoms-
- epinasty (downward curvature) of petioles
- production of adventitious roots from the lower part of the stem
- thickening of the stem.

Root diseases….

Vascular wilt disease symptoms in *Moringa pterygosperma* and *Acacia nilotica*

Root diseases….



Root diseases….

Possible cause of wilt symptoms are:

1. Production of low molecular wt. toxins by the pathogen-fusaric acid (affect cell membrane permeability)

Wilting can be caused by:

a) Reduction in uptake and transport of water

- by mechanical obstruction of the xylem tracts - fungal mycelium or structures, induced tyloses formation

- by increased loss of water due to an increase in the permeability of cell membranes

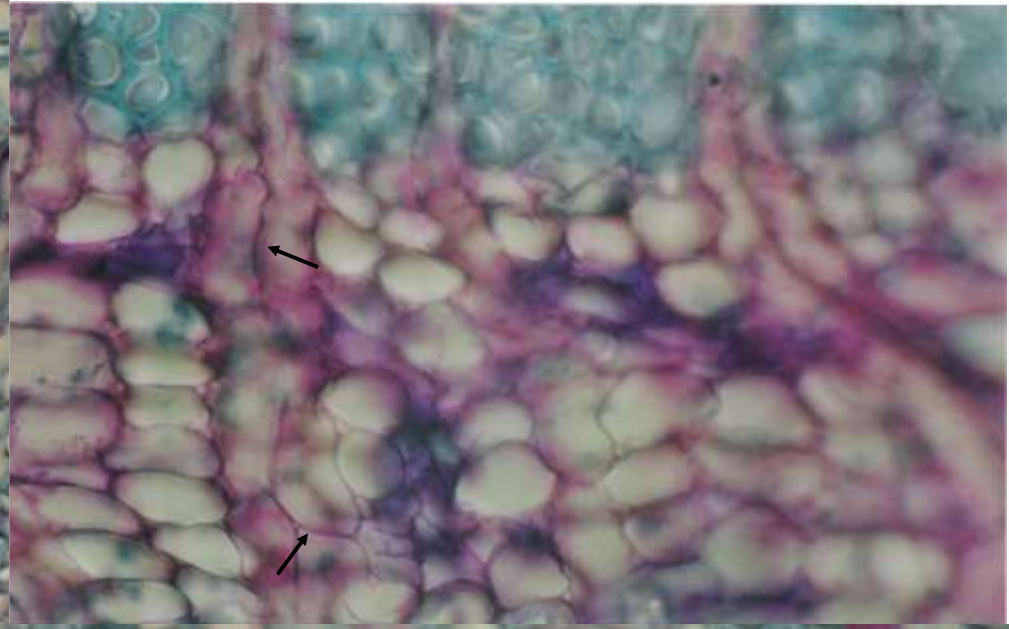
b) Impairment of stomatal functioning

2. Production of fungal metabolites having growth regulating activity for plants such as IAA and ethyl-causing epinasty of petiole and formation of adventitious roots.

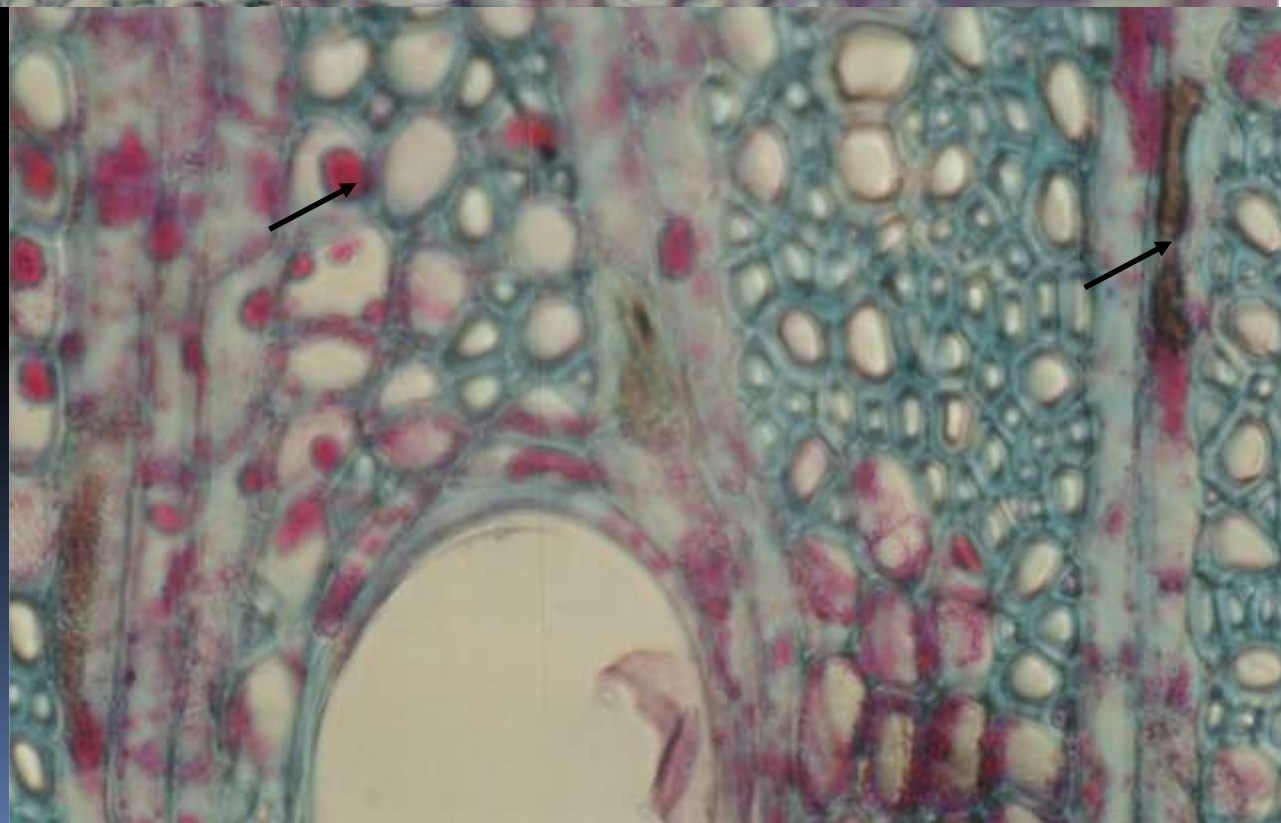
3. Production by pathogen of polysaccharides and other substance of high molecular wt. which can cause impedance of water flow in the xylem

4. Vascular obstruction by gels resulting from degradation of xylem cell wall by enzyme of the pathogen - pectinase enzymes

Root diseases….



Fungal structures in xylem vessels, intracellular spaces and obstruction by secondary metabolites



Root diseases….

Web Blight

Root diseases….

Charcoal root rot in pine

Root diseases….

Set rot of cuttings

Root diseases….

Set rot of cuttings

Root diseases….

Cylindrocladium blight in eucalyptus

Dead seedlings and wasted bags

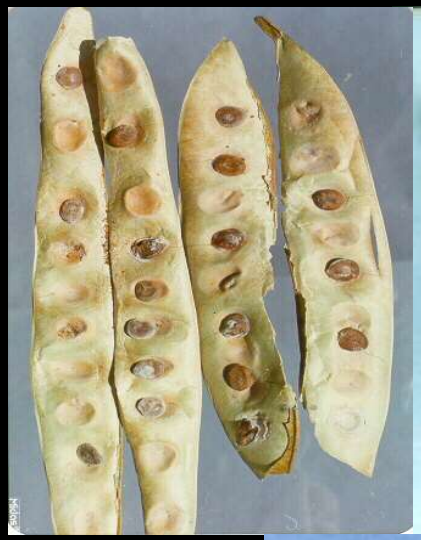
Management of diseases to raise quality planting stock

- **Effective management depends upon –**
  - ❖ **Correct diagnosis**
  - ❖ **Knowledge of pathogen, host range, disease cycle and factors favouring disease development**
  - ❖ **Economic feasibility**

- **Conditions created in hi-tech nurseries, mist chambers, glass houses, net houses like availability of moisture, humidity, and continuous shade favour the establishment and development of the diseases in the planting stock**
- **There are cultural and chemical methods of control of root diseases in nurseries.**

Cultural Methods

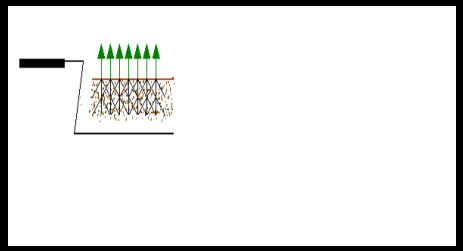
- Use apparently healthy seeds



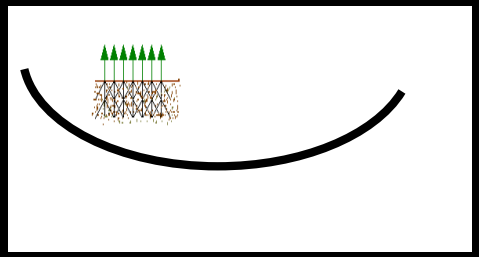
Avoid discoloured, shrinkled, spotted, fungoid, abnormal size seeds

Cultural methods ……

- Use well-drained seed beds
- Give adequate watering
- Careful uprooting for pricking out – moisten the seed bed or tray, then pick up the seedlings along with the soil using a hoe and putting them in a container with water



Picking up seedlings with soil using a hoe



Putting up seedlings with soil in a container with water

- Remove weeds regularly
- Eradicate infected plants
- Avoid use of same bed for raising same species

Chemical Control

- **Fungicides – systemic and non-systemic**
- **Seed treatments (seed dressing)**
  - **During storage - Dry seed treatment**
  - **Before sowing - Slurry dressing, Seed dip**

- Seed dressing with Bavistin, Topsin-M, Benlate or Thiram @ 0.2% by seed wt.

Formula

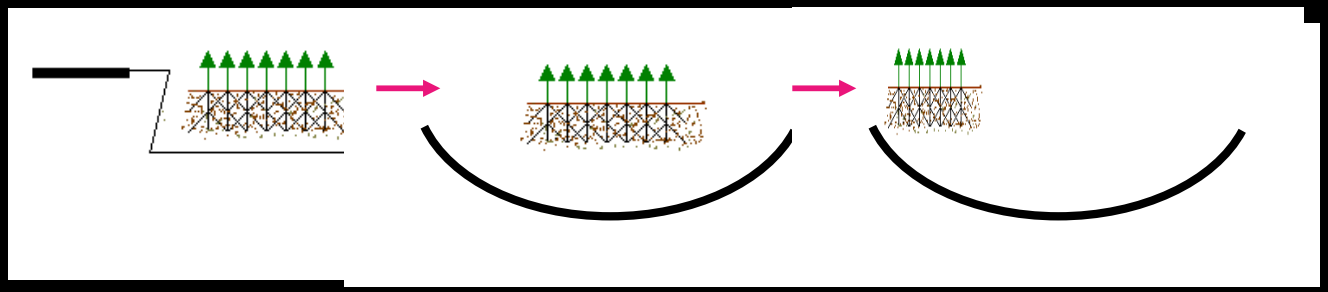
Amount of fungicide required (g)=

$$\frac{\text{Conc. desired x Quantity of seeds (g)}}{\text{Active ingredient of fungicide}}$$

Amount of fungicide required (g) =

$$\frac{\text{Conc. desired x Volume of solution (ml)}}{\text{Active ingredient of fungicide}}$$

- Soil drenching @ 0.05%; 10 l for 10 x 1 m bed
- Root dip in 0.02% soln. for 3 – 5 min. before pricking out



Container with water

Container with fungicide soln. (3-5 min)

Pricking out in containers

- Dip cuttings in 0.3% solution of Bavistin/Bayleton for 10-15 min. to check set rot

Seedlings without seed treatment

Effective seed treatment for the management of root diseases

General Preventive Measures in Mist Chambers, Green Houses, Shade-net Houses

- **Disinfection of beds/root trainers – with proper disinfectants.**
- **Use disinfectants for nursery tools, secateurs, shoes at the entry.**
- **Disinfection of rooting medium – nutrient supplementation with suitable fungicides.**
- **Disinfection of potting mix – soil drench with suitable fungicides, if needed.**
- **Fresh air circulation – provision for proper exhausts.**

Management strategy contd……..

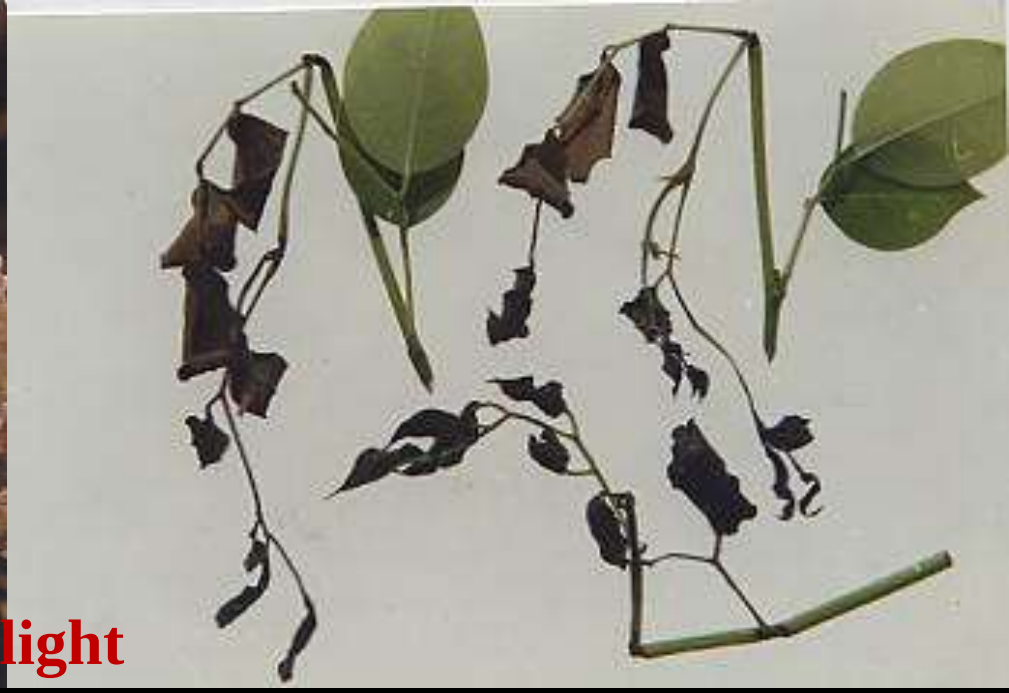
- Proper water outlets/drains to avoid accumulation of water.
- Regular surveillance and monitoring.
- Early diagnosis and eradication.
- Timely treatment – adequate dose with proper fungicides.
- Timely shifting – from beds/root trainers.
- Proper care.

Foliar Diseases

- Leaf spots
- Leaf blights
- Leaf scorch
- Leaf rusts
- Powdery mildews
- Adversely affect physiological functions
- Premature defoliation influencing overall health, growth and vigour of seedlings

Foliar diseases

Leaf spots



Blight

Scorch

Rust

Powdery mildew

Foliar diseases of poplar

Cultural Methods

- Give adequate watering
- Avoid crowding of seedlings
- Avoid continuous shade
- Remove weeds regularly
- Eradicate infected leaves
- Keep plants of same species at a distance

Chemical Control

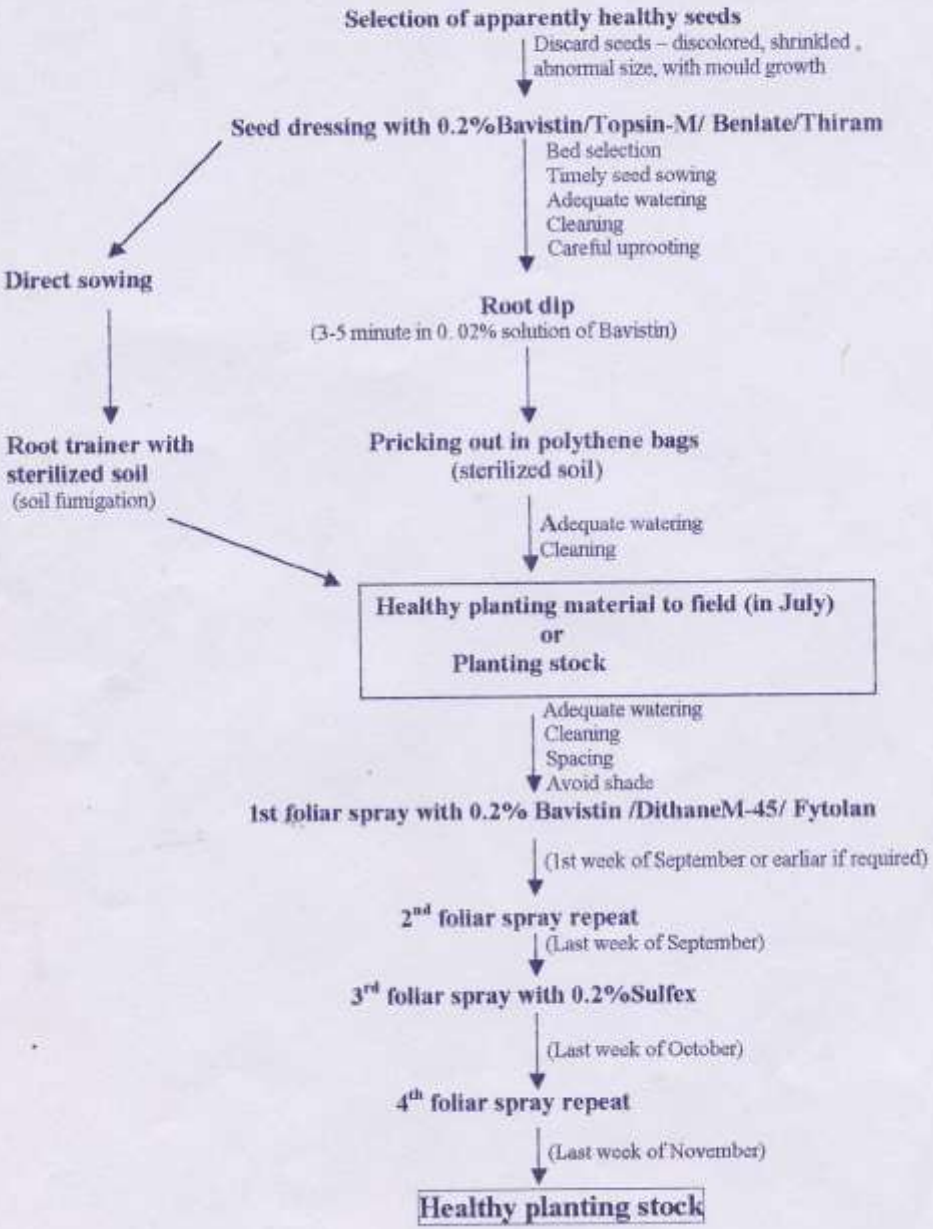
Formula

Amount of fungicide required =

$$\frac{\text{Conc. Desired x Volume of solution (ml)}}{\text{Active ingredient of fungicide}}$$

- Foliar spray with 0.2% Bavistin, Dithane M-45, Copper oxychloride
- For Rusts and Powdery Mildews – foliar spray with 0.2% Sulfex/ Sulphur powder/Bayleton
- Add sticker (liquid soap or shampoo) in the fungicidal solution
- Repeat foliar spray after a fortnight

Integrated disease management plan for nurseries



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